

Preschool and Completion of Secondary Education in Ethiopia: Lessons Drawn from Young Lives

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1. Introduction

- Early childhood: a period of crucial phase of growth and development, where early circumstances can influence outcomes across the entire course of an individual's life (WHO, 2012)
- Preschool education: critical in forming the foundation for life-long learning and providing children the opportunity to reach their full potential (Cunha, Heckman, Lochner & Masterov, 2005; Cunha & Heckman, 2006).
- It may help break the intergenerational cycle of poverty (Heckman, 2012 & Woodhead et al., 2009) and inequality (Cueto, 2016 & Woldehanna, 2016)

Introduction

- **In terms of expected monetarily return, Previous research works indicate that return to education is 8.6%**

*“expanding early learning initiatives would provide benefits to society of **roughly \$8.60** for **every \$1 spent**, about half of which comes from increased earnings for children when they grow up.”*

2. The Ethiopian Context

- There is little empirical evidence on the long-term impact of preschool education in Ethiopia
- As far as it is known, only few studies are conducted in Ethiopia (Woldehanna, 2011, 2012 & 2016; Azubuike, 2014; Orkin, Yadete & Woodhead, 2012 and Hoot, Szente & Mebratu, 2002).
- In fact, Ethiopia has lately seen much improvement on the **Net Enrolment** rate of primary education, reaching **92.6% in 2013/14** (MOE, 2013/14) and **94% in 2014/15** (MoE, 2015)
- But school completion (primary, secondary..) is very low.
- This is widely believed to there is limited foundation form below and unsuccessful completion from above

3. Research Questions

1. Does attending preschool offer an advantage on successful completion of Secondary Education?
1. Does duration (a two or three years) of preschool education have additional benefits on the completion of secondary education?
1. Does the impact of preschool education go beyond successful completion of secondary education such as transitioning to institutions of higher learning?

Overview of Preschools in Ethiopia

Type	Funding	Children/family served	Generally perceived quality	Generally perceived limitation
Private preschools	Parent fees	Upper SES families	Very high quality of education	Potential conflict between private school curricula & MOE guidelines
Government preschools (O' Class' and Child to child since 2011/2)	Government stipend plus parent fees	General population/lower SES families	Basics	Lack of material, large class (50-100+) class size, poor management, little in service preparation, with qualified teachers
Quisi-public School	Government stipend plus parent fees	Middle and upper class families	Good-quality	Potential conflict between MoE and schools governing boards composed of elected parents
Community Mission Church schools , Nongovernment (NGO) schools	Religious denomination sponsor Parent fees	Middle and upper class families and a few scholarships for lower SES Foreign diplomats and upper SES classes	Good-quality of education, High quality education	Limited inputs from parents Although in Ethiopian community, schools culture and traditions of western culture are emphasized

4. Conceptual Framework

- we formulate a conceptual framework of preschool investment decision of an altruistic parent.
- built up on the work of Heckman and Ruat (2005), who divide the whole life-cycle of a child into four periods:
[0-6], [7-14], [15-16] & [17-).
- Let \bar{PS} denotes the level of parental preschool investment that help the child develop cognitive skills and non-cognitive skills
- Each type of skills that the child acquires also depends on other factors like home environment, household socio economic status (measured by wealth index), level of parental education and related social skills.

Empirical model

- As there is no information in the data on the money spent by a parent in preschool education, **dummy variable** was created if the parent sent the child to preschool center anytime between **3 and 6** years of old, for at least six months.
- Again, to examine the differential effect of duration of attendance, we divide the number of preschool academic years into three:
 - 1 year preschool attendance
 - 2 years preschool attendance
 - 3 years of preschool attendance

Logit model

- Completion of secondary education (DV) is approximated by dummy variable if the child completed 10th grade by the 4th round of the survey (age of 19 years) .
- The logit model is derived from a latent variable, y^*

$$y^* = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k + u$$

$$= x\beta + u \quad [1]$$

$$y_i = \begin{cases} 1 & \text{if } y_i^* > 0 \\ 0 & \text{if } y_i^* \leq 0 \end{cases} \quad [2]$$

Assuming that the error term follows a logistic distribution, the probability for successful completion of secondary education is given by

$$\text{Pr}(y = 1 / x) = \frac{e^{x\beta}}{1 + e^{x\beta}} \quad [3]$$

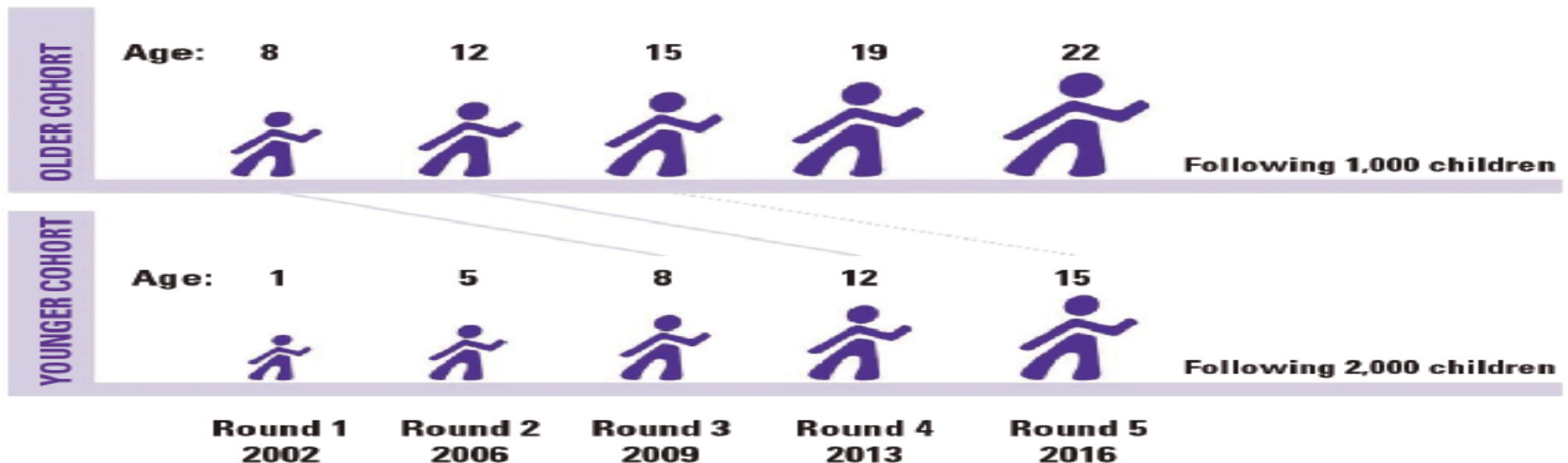
Endogeneity problem and identification strategy

- (1) Standard IV using community dummies as instrument – sites in AA and Hawassa
- (2) Wooldridge IV (2002: 623) using predicated probabilities (propensity score) from first stage of logit regression as instrument for preschool in the logit regres.
- (3) We also check the robustness the results using regression of **Propensity Score Matching** (for children in the common support)

5. Data

- Early education data on children in Ethiopia are so scant, almost as though they were neither seen nor heard (Hoot et.al, 2004).
- But Young Lives Longitudinal Study has rich dataset on this regard.

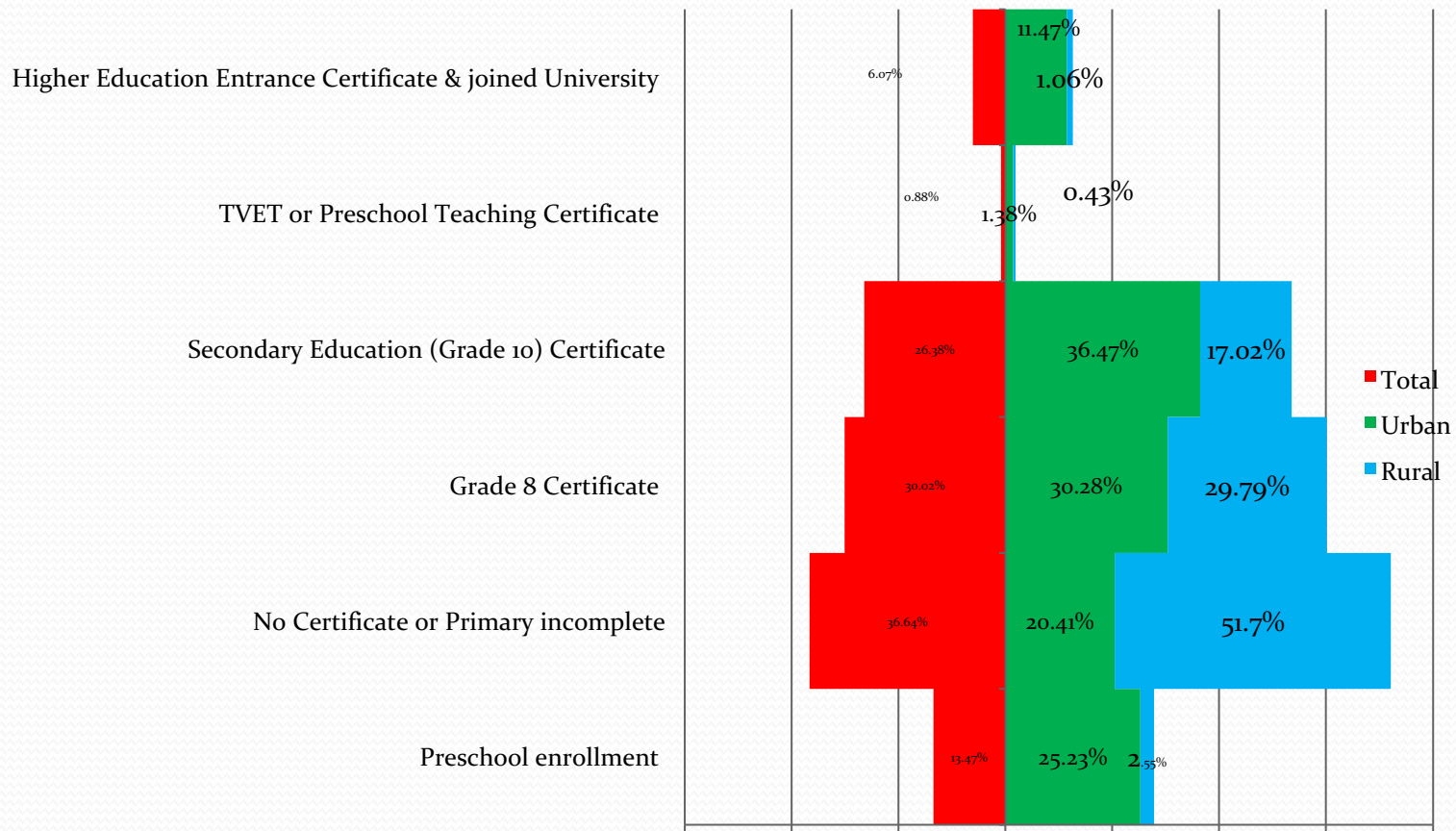
Figure 2. Young Lives design



6. Result : 6.1. Descriptive Statistics: Rural; urban, total)

Variable	Urban		Rural		Total	
	N	Mean	N	Mean	N	Mean
Dummy if Completed Ethiopian General Secondary Education	436	0.493	470	0.187	908	0.334
Dummy for preschool attendance b/n 3 & 6	436	0.252	470	0.026	908	0.134
Dummy for 1 year of preschool attendance	436	0.080	470	0.021	908	0.050
Dummy for 2 years of preschool attendance	436	0.101	470	0.004	908	0.051
Dummy for 3 years of preschool attendance	436	0.071	470	0	908	0.034
Dummy for private preschool	436	0.165	470	0	908	0.079
Dummy for community preschool	436	0.037	470	0	908	0.018
<u>Dummy for governmental preschool</u>	<u>436</u>	<u>0.050</u>	<u>470</u>	<u>0.026</u>	<u>908</u>	<u>0.037</u>

Highest Educational Certificate Received at round 4: 2014



Source: Own computation based on Young Lives R4 Older Cohort data

6.2. Estimation results

VARIABLES	Logit Model 1	Logit Model 2	Logit Model 3
Dependent variable: high school completion	Marginal effect	Marginal effect	Marginal effect
Dummy if child attended preschool b/n age 3 & 6	0.257*** (4.144)	-	-
height-for-age z-score at age 8	0.0953*** (4.058)	0.0935*** (3.976)	0.0967*** (4.091)
Dummy for Household with 2 nd tercile WI	0.230** (2.186)	0.219** (2.072)	0.226** (2.134)
Dummy for Household with 3 rd tercile WI	0.365*** (3.963)	0.358*** (3.854)	0.357*** (3.795)
Dummy if the birth order of child is 4 th or after	0.140* (1.904)	0.148** (2.010)	0.140* (1.900)
Dummy if the teenage has become a parent	-0.254** (-2.107)	-0.250** (-2.031)	-0.249** (-2.016)
Dummy if child worked at least 1 hr/day at age 15	-0.290*** (-3.769)	-0.300*** (-3.863)	-0.293*** (-3.816)
Dummy for 1 year of preschool attendance	-	0.168* (1.741)	-
Dummy for 2 years of preschool attendance	-	0.213** (2.486)	-
Dummy for 3 years of preschool attendance	-	0.401*** (5.360)	-
Dummys for private preschool	-	-	0.294*** (4.161)
Dummy for community preschool	-	-	0.161 (1.204)
Dummy for governmental preschool	-	-	0.205* (1.796)
Observations	426	426	426

Marginal effects of Ordered Logit models): Urban

VARIABLES	(Ordered Logit 5) HE mfx	(Ordered Logit 4) TVET&T mfx	(Ordered Logit 3) SE mfx	(Ordered Logit 2) PE mfx	(Ordered Logit 1) NO mfx
Dummy variable for 1 year of preschool attendance	0.0239 (0.802)	0.00282 (0.787)	0.0458 (0.945)	-0.0360 (-0.823)	-0.0365 (-0.963)
Dummy variable for 2 years of preschool attendance	0.0441 (1.372)	0.00508 (1.266)	0.0748* (1.843)	-0.0644 (-1.470)	-0.0595* (-1.853)
Dummy variable for 3 years of preschool attendance	0.112** (2.055)	0.0118* (1.759)	0.122*** (4.786)	-0.141*** (-2.664)	-0.104*** (-3.803)
height-for-age z-score at age 8	0.0275*** (4.351)	0.00333** (2.221)	0.0615*** (4.468)	-0.0419*** (-4.087)	-0.0504*** (-4.675)
Dummy variable for Household with 2 nd tercile wealth index	0.0512 (1.607)	0.00599 (1.411)	0.0955** (2.000)	-0.0754* (-1.717)	-0.0773** (-1.976)
Dummy variable for Household with 3 rd tercile wealth index	0.0923*** (3.775)	0.0111** (2.170)	0.214*** (4.282)	-0.119*** (-4.446)	-0.198*** (-3.707)
^^^Some Control variables omitted ^^					
Dummy variable if the teenage has become a parent	-0.0442** (-2.115)	-0.00565 (-1.599)	-0.140 (-1.591)	0.0519*** (4.032)	0.138 (1.289)
Dummy if child worked at least 1 hr/day at age 15	-0.0662*** (-5.030)	-0.00851** (-2.310)	-0.225*** (-4.653)	0.0506** (2.085)	0.249*** (3.439)
Dummy variable for male	-0.0120 (-0.847)	-0.00145 (-0.808)	-0.0267 (-0.850)	0.0182 (0.847)	0.0219 (0.850)
Observations	426	426	426	426	426

z-statistics in parentheses and *** p<0.01, ** p<0.05, * p<0.1

IV estimation of Completion of Secondary Education

Variables	Standard IV ^[a] mfx	Wooldridge IV ^[b] mfx	Propensity score Matching mfx
Dummy if child attended preschool b/n age 3 & 6	0.320*** (3.477)	0.304*** (3.467)	0.358*** (5.046)
height-for-age z-score at age 8	0.0670*** (3.843)	0.0677*** (3.886)	0.104*** (3.232)
Dummy for Household with 2 nd tercile WI	0.148** (2.132)	0.154** (2.230)	0.193 (1.168)
Dummy for Household with 3 rd tercile WI	0.268*** (3.949)	0.269*** (3.982)	0.376* (1.786)
Dummy variable if the teenage has become a parent	-0.207* (-1.933)	-0.202* (-1.863)	-0.171 (-0.621)
Dummy if child worked at least 1 hr/day at age 15	-0.233*** (-3.539)	-0.237*** (-3.572)	-0.227 (-1.192)
^^^Other control variables omitted^^^			
Observations	426	426	218
Centered R2	0.215	0.217	
Uncentered R2	0.6055	0.6067	
Under identification test (Kleibergen-Paap rk LM statistic) (idstat)	84.736	87.880	
Chi-sq(5) P-val	0.0000	0.0000	
Hansen J statistic (over identification test of all instruments):	5.339	-	
Chi-sq(1) P-val	0.2542	-	

Note: Robust z-statistics in parentheses and *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

[a] community sites as instrument

[b] Predicted probabilities as instrument (Wooldridge (2002: 623))

Discussion and Implications

- *Preschoolers are 25.7% more likely to complete secondary education than their non-preschool counterparts at the proper age (Controlled for relevant covariates)*
- *The marginal returns are higher for 3 and 2 years. Those who attended for three years are particularly found with higher probability of making transition to higher education at the age of 19.*
- *The results are robust to alternative methods (IV estimators and Propensity Score matching estimators)*

The outcome of this research is important in a number of ways:

- **In Ethiopia enrolment rate** is very low in secondary (20%) and higher education (10%)
- Could be improved if children obtain quality pre-school education
- However, public investment in this vital learning stage has been historical non-existence
- Hence only urban richer family who could afford paying have had the chance to send their kids to pre-school
- Government is in the process of scaling up the O-class (one year pre-school),
- but important to underline that it is the full two or three preschool that is found to have a long-lasting effect and lead to institutions of higher learning at proper ages



Thank you

Definition of the ordered DV

- The Ordered Logit Model is developed with a five level Dependent Variables (DV), adopting values of
 - 1 = for adult children with “*not educational certificate*” (those who are either with incomplete primary school or never enrolled in school);
 - 2= for those with “*Grade 8 certificate*”;
 - 3= for those with certificate of “*Ethiopian General Secondary Education*”;
 - 4= for those with certificate of TVET or “*Preschool Teaching*”; *and*
 - 5= for those who received certificate on the “*Ethiopian Higher Education Entrance*” and made their way to institutions of higher learning by the 4th round of the survey.